

Monolithic Rare Earth Doped PTR Glass Laser, Phase II

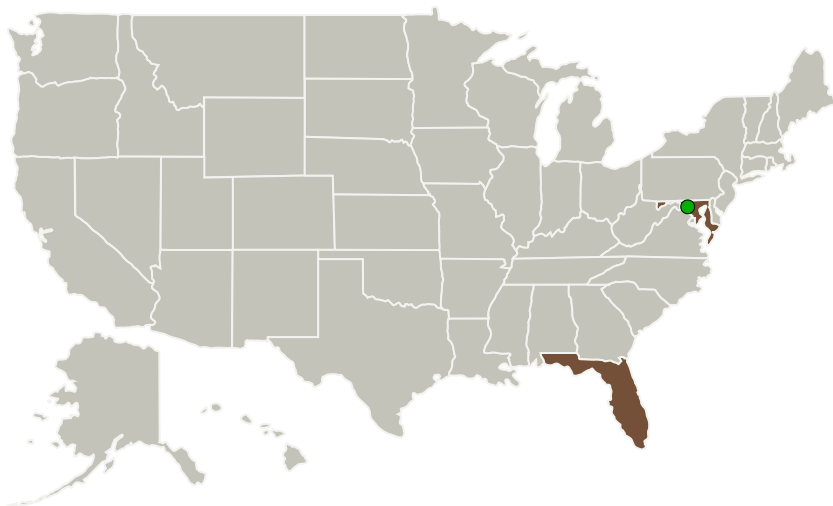
Completed Technology Project (2011 - 2013)



Project Introduction

The main goal of the project is to demonstrate the feasibility of a monolithic solid state laser on the basis of PTR glass co-doped with luminescent rare earth ions. The main feature of this new complex material is its ability to be simultaneously an active laser medium and a phase photosensitive medium. That way the same piece of material can be used as laser gain element and a monolithic laser resonator produced by the recorded in that volume Bragg gratings (VBGs). A series of PTR glasses co-doped with rare-earth ions (Nd, Yb and Er) was fabricated. It was shown that those glasses possess both high efficiency of luminescence and photosensitivity (photo-thermo-induced change of refractive index). A technology of the recording of volume Bragg gratings in each of these new PTR glasses was developed and controllable diffraction efficiency between 10 and 99% was demonstrated. A laser was demonstrated in Nd-doped PTR glass plate using an external Fabry-Perot resonator based on two plane dielectric mirrors with longitudinal pumping by laser diodes at 808 nm. Lasing and narrowing of spectrum down to ~20 pm is demonstrated when one of the mirrors was replaced by a high efficiency VBG.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
OptiGrate Corporation	Lead Organization	Industry	Orlando, Florida
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Florida	Maryland

Project Transitions

▶ **June 2011:** Project Start

✓ **May 2013:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139126>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

OptiGrate Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

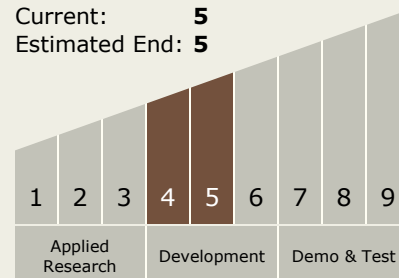
Carlos Torrez

Principal Investigator:

Vadim Smirnov

Technology Maturity (TRL)

Start: 4
Current: 5
Estimated End: 5



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Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.5 Lasers

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System